

# Introduction to Data Management

## CSE 344

### Lecture 3: SQL Basics

# Announcements

- WQ1 due on Tuesday
  - Any issues?
- WQ2 will be out tomorrow
  - SQL basics and aggregates
  - Due in 1 week
- HW1 due on Wednesday

# Review

- Relational data model
  - Instance and schema
- SQL for manipulating relational data
  - Create tables
  - Retrieve records from tables
  - Declare keys and foreign keys

# Review

- Tables are NOT ordered
  - they are sets or multisets (bags)
  - arity: # of attributes in a relation
  - cardinality: # of records in a relation
- Tables are FLAT
  - No nested attributes
- Tables DO NOT prescribe how they are implemented / stored on disk
  - This is called **physical data independence**

# From Last Time: Adding Attributes

Company(cname, country, no\_employees, for\_profit)

cname	country	no_employees	for_profit
Canon	Japan	50000	Y
Hitachi	Japan	30000	Y

- Let's add a list of product that each company produces
  - How? Recall that tables are flat!

# From Last Time: Adding Attributes

Company(cname, country, no\_employees, for\_profit)

<u>cname</u>	country	no_employees	for_profit
Canon	Japan	50000	Y
Hitachi	Japan	30000	Y

Product(pname, price, category, manufacturer)

<u>pname</u>	price	category	manufacturer
SingleTouch	149.99	photography	Canon
AC	300	Appliance	Hitachi

# Today

- SQL Basics
  - Selection
  - Projection
  - Ordering and distinct
  - Joins

# SQL

- SQL
  - **Structured Query Language**
  - Most widely used language to query relational data
  - One of the many languages for querying relational data
  - A declarative programming language



# Selections in SQL

```
SELECT *  
FROM Product  
WHERE price > 100.0
```

*selection  
predicate*

# Demo

# Joins in SQL

```
SELECT pname, price  
FROM Product, Company  
WHERE manufacturer=cname AND  
country='Japan' AND price < 150
```

```
Product(pname, price, category, manufacturer)  
Company(cname, country)
```

What does this query do?

# Joins in SQL

```
SELECT pname, price  
FROM   Product, Company  
WHERE  manufacturer=cname AND  
       country='Japan' AND price < 150
```

```
Product(pname, price, category, manufacturer)  
Company(cname, country)
```

Retrieve all Japanese products  
that cost < \$150

# Joins in SQL

Product(pname, price, category, manufacturer)  
Company(cname, country)

pname	price	manufacturer
MultiTouch	199.99	Canon
SingleTouch	49.99	Canon
SuperGizmo	250.00	GizmoWorks

cname	country
GizmoWorks	USA
Canon	Japan

```
SELECT pname, price
FROM Product, Company
WHERE manufacturer=cname AND
      country='Japan' AND price < 150
```

# Joins in SQL

Product(pname, price, category, manufacturer)  
Company(cname, country)

pname	price	manufacturer
MultiTouch	199.99	Canon
SingleTouch	49.99	Canon
SuperGizmo	250.00	GizmoWorks

cname	country
GizmoWorks	USA
Canon	Japan

Retrieve all American companies that manufacture “gadget” products

# Joins in SQL

```
Product(pname, price, category, manufacturer)  
Company(cname, country)
```

pname	price	manufacturer
MultiTouch	199.99	Canon
SingleTouch	49.99	Canon
SuperGizmo	250.00	GizmoWorks

cname	country
GizmoWorks	USA
Canon	Japan

```
SELECT DISTINCT cname  
FROM Product, Company  
WHERE country='USA' AND category = 'gadget'  
AND manufacturer = cname
```